

# Bachelor of Science with Major in Biology (Professional Health Sciences Emphasis)

This major is designed for students interested in medical professions (medicine, osteopathic medicine, dentistry, optometry, pharmacy, podiatry and veterinary), or allied medical professions (physician assistant, occupational therapy, physical therapy, or medical research). Health sciences students should consult with their Biology advisor and the Health Sciences advisor in the College of Arts and Sciences to develop an appropriate course of study.

Required 120 credits (36 of which must be numbered 300 or above, and 30 of which must be from UND), including:

I. Essential Studies requirements (see University ES listing, minimum 39 total credits). The following courses must be taken as part of the Essential Studies requirement:

Code	Title	Credits
ENGL 110	College Composition I	3
ENGL 130	Composition II: Writing for Public Audiences	3
COMM 110	Fundamentals of Public Speaking	3
<b>Total Credits</b>		<b>9</b>

II. 39 major hours including:

A. Core requirements (18 credit hours), all courses below:

Code	Title	Credits
BIOL 120	Orientation to the Biology Major	1
BIOL 150 & BIOL 151	General Biology I and General Biology II *	6
BIOL 150L & BIOL 151L	General Biology I Laboratory and General Biology II Laboratory	2
BIOL 315	Genetics	3
BIOL 341	Cell Biology	3
BIOL 480	Senior Capstone Seminar **	3
<b>Total Credits</b>		<b>18</b>

\* Students who take BIOL 111 Concepts of Biology and BIOL 111L Concepts of Biology Laboratory and earn a grade of "B" or higher in both of those courses prior to becoming a Biology major may complete the General Biology sequence by taking BIOL 150 General Biology I and BIOL 150L General Biology I Laboratory.

\*\* Three credits for an accepted BIOL 489 Senior Honors Thesis can be substituted for the BIOL 480 Senior Capstone Seminar with prior approval of the thesis topic by the Chair of Biology.

We strongly advise mastery of materials in all core courses except BIOL 480 Senior Capstone Seminar prior to enrolling in other 300 or 400 level Biology courses.

At least 15 of the total 39 credits required for the BS degree must be taken in the UND Biology department, exclusive of the credits earned in other departments and institutions.

B. Advanced requirements (minimum 21 credit hours of upper level Biology courses):\*

Code	Title	Credits
1. Must include a minimum of 9 credits from the following health-related courses below:		

BIOL 364	Parasitology
BIOL 364L	Parasitology Laboratory
BIOL 369	Histology
BIOL 369L	Histology Lab
BIOL 378	Developmental Biology
BIOL 380	Disease Biology
BIOL 390	Endocrinology
BIOL 415	Genomics
BIOL 418	Systems Biology
BIOL 420	Neuroscience
BIOL 442	Physiology of Organs and Systems
BIOL 442L	Physiology of Organs and Systems Laboratory
BIMD 220 & 220L	Human Anatomy Physiology I and Human Anatomy Physiology I Lab **
or BIMD 221 & 221L	Human Anatomy Physiology II and Human Anatomy Physiology II Lab
BIMD 302	General Microbiology Lecture
BIMD 302L	General Microbiology Laboratory
BIMD 328	Introduction to Immunology

2. Additional 12 credits of upper level Biology electives. All 300 or 400 level Biology courses will count toward the elective credit hours needed. Certain science courses in other departments may also qualify as electives (see examples below). Only one 200 level course will count towards Biology elective credits.

3. Laboratory Requirement. At least four upper-division Biology courses with laboratories must be included. The following labs or courses satisfy this requirement:

BIOL 312L	Evolution Laboratory
BIOL 332L	Gen Ecology Lab
BIOL 336	Systematic Botany
BIOL 341L	Cell Biol Lab
BIOL 363	Entomology
BIOL 364L	Parasitology Laboratory
BIOL 369L	Histology Lab
BIOL 376L	Animal Biology Laboratory
BIOL 410	Molecular Biology Techniques
BIOL 415	Genomics
BIOL 416	Ecological Genomics
BIOL 418	Systems Biology
BIOL 425	Ichthyology
BIOL 427	Ornithology
BIOL 428	Mammalogy
BIOL 431	Wildlife Management
BIOL 433	Aquatic Ecology
BIOL 438	Fisheries Management
BIOL 442L	Physiology of Organs and Systems Laboratory
BIMD 302L	General Microbiology Laboratory

• Up to three of the following courses from UND departments outside Biology can be applied toward the 39 credits required for a BS in Biology degree (lecture + lab = 1 course). Other courses will be considered on a case by case basis. To have a course considered, the student should provide a syllabus to the Department Chair.

Code	Title	Credits
BIMD 220 & 220L	Human Anatomy Physiology I and Human Anatomy Physiology I Lab **	4
or BIMD 221 & 221L	Human Anatomy Physiology II and Human Anatomy Physiology II Lab	
BIMD 302 & 302L	General Microbiology Lecture and General Microbiology Laboratory	4
BIMD 328	Introduction to Immunology	3
BIMD 401	Advanced Biochemistry	3

\* No more than 10 combined credit hours from BIOL 494 Directed Studies; BIOL 492 Research; BIOL 491 Seminar; and BIOL 489 Senior Honors Thesis, will count towards this 39 credit major.

\*\* Either BMD 220/220L or BMD 221/221L will count as an elective, but not both courses.

- BMB 301 Biochemistry will not be allowed to fulfill elective requirements.
- BMD 202 Introduction to Medical Microbiology Lecture/BMD 202L Introduction to Medical Microbiology Laboratory will only be allowed with special permission of the Biology department.

medicine students because some medical schools require or prefer this combination.  
 # Students may take BIOL 470 and have those credits count toward biology electives AND satisfy the statistics requirement.

III. Cognate requirements in other departments (29-32 credit hours):

Code	Title	Credits
<b>Mathematics *</b>		
MATH 146 or MATH 165	Applied Calculus I ** Calculus I	3-4
<b>Chemistry</b>		
General Chemistry		
CHEM 121 & 121L & CHEM 122 & CHEM 122L	General Chemistry I and General Chemistry I Laboratory and General Chemistry II and General Chemistry II Laboratory	
OR		
CHEM 221 & 221L & CHEM 254 & CHEM 254L	Fundamentals of Chemistry - Concepts and Fundamentals of Chemistry Laboratory and Inorganic Chemistry I and Inorganic Chemistry I Laboratory ***	
Organic Chemistry		
CHEM 340 & 340L & BMD 301	Survey of Organic Chemistry and Survey of Organic Chemistry Laboratory and Biochemistry	
OR		
CHEM 341 & 341L & BMD 301	Organic Chemistry I and Organic Chemistry I Laboratory and Biochemistry	
OR		
CHEM 341 & 341L & CHEM 342 & CHEM 342L	Organic Chemistry I and Organic Chemistry I Laboratory and Organic Chemistry II and Organic Chemistry II Laboratory ****	
<b>Physical Sciences</b>		
PHYS 161 & PHYS 162	Introductory College Physics I and Introductory College Physics II (OR)	
OR		
PHYS 211 & PHYS 212	College Physics I and College Physics II (OR)	
OR		
PHYS 251 & PHYS 252	University Physics I and University Physics II	
<b>Statistical Methods and Data Interpretation</b>		
Select one of the following:		3
BIOL 470	Biostatistics #	
PSYC 241	Statistics for the Behavioral Sciences	
SOC 326	Sociological Statistics	
MATH 321	Applied Statistical Methods	

\* Students with a particular aptitude for mathematics should consider taking both MATH 165 Calculus I and MATH 166 Calculus II and should consult with their adviser regarding this potential option.

\*\* Prerequisites for either course are the responsibility of the student.

\*\*\*The chemistry sequence CHEM 221, CHEM 221L, CHEM 254, and CHEM 254L is intended for students with a strong background and interest in chemistry and presumes some exposure to calculus.

\*\*\*\*The sequence of CHEM 341 Organic Chemistry I and CHEM 342 Organic